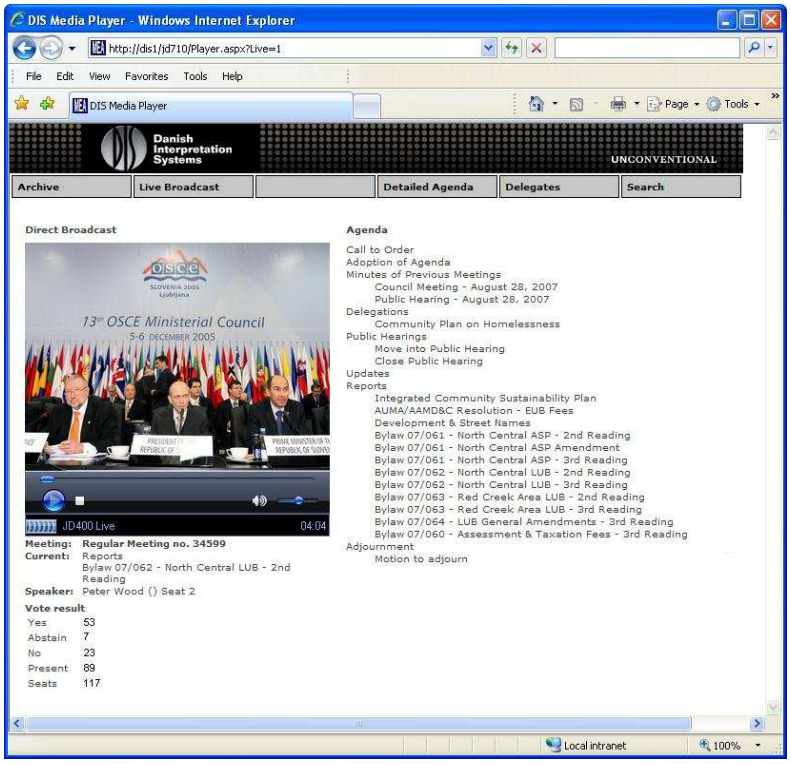
DCS 6000

Installation Manual

Digital Conference System



SW 7010 Streaming and Archiving Software

SW version 1.05

Installation Manual

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Introduction

This manual describes how to design a system to use the SW 7001 Streaming Software in connection with the SW 6000 Conference Software.

This document does however not describe the use of the SW 6000 CUA and CAA applications but describes the settings and controls used for the SW 7001 Streaming Package only. Please consult the relevant manuals for more details about installing and using these applications.

The manual does also give detailed descriptions of the more technical parts of the SW 7001 Streaming Package installation.

Important

Installation and setting up the SW 7001 Streaming demands a throughout knowledge of Microsoft products like Windows XP, Microsoft Server 2003, Microsoft SQL Server 2005 and experience in using and setting up those products.

Integrating the JD710 Media Player in customer web site demands knowledge to html programming and web site programming.and design.

System design

Applications

The SW 7001 Software Packages consists of the following main applications/setups.

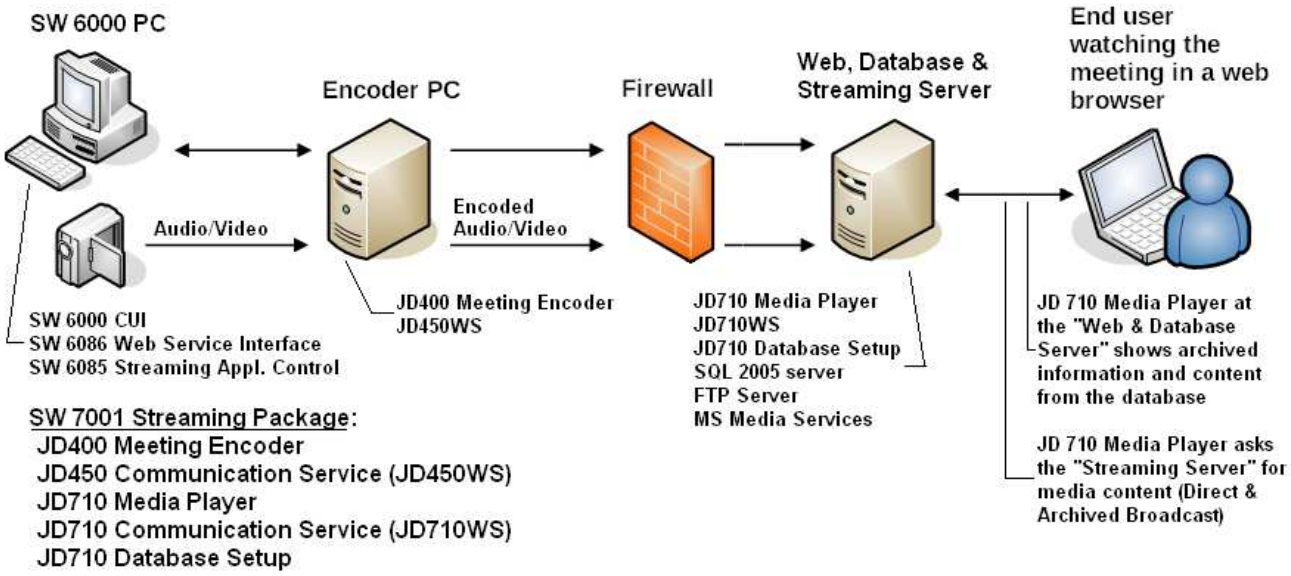
- **JD400 Meeting Encoder**
- **JD450 Communication Service (JD450WS)**
- **JD710 Media Player**
- **JD710 Communication Service (JD710WS)**
- **JD710 Database Setup**

For streaming to a large number of users on the www a system has to be setup like shown in the below schematics in the “Installation Design’. Depending on the ‘number of users’ various setups can be used. Please refer to the section “Streaming bandwidth and storage “

In the schematic three PC’s/Server are used however all can be installed on one PC for demo purposes if the number of users are less than 5. Also the two servers can be combined to one for smaller systems.

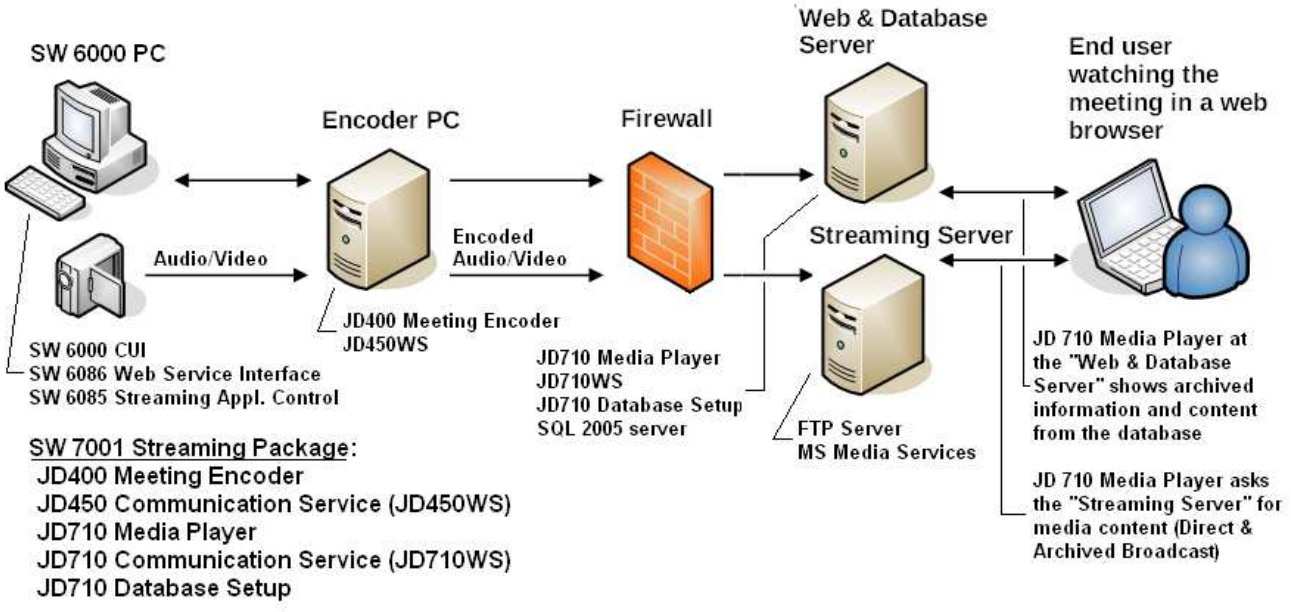
Installation design

Combined Web, Database & Streaming server


SW 6000 PC
Encoder PC
Firewall
Web, Database & Streaming Server
End user watching the meeting in a web browser
Audio/Video
Encoded Audio/Video
JD400 Meeting Encoder
JD450WS
SW 6000 CUI
SW 6086 Web Service Interface
SW 6085 Streaming Appl. Control
JD710 Media Player
JD710WS
JD710 Database Setup
SQL 2005 server
FTP Server
MS Media Services
JD 710 Media Player at the "Web & Database Server" shows archived information and content from the database
JD 710 Media Player asks the "Streaming Server" for media content (Direct & Archived Broadcast)

SW 7001 Streaming Package:
- JD400 Meeting Encoder
- JD450 Communication Service (JD450WS)
- JD710 Media Player
- JD710 Communication Service (JD710WS)
- JD710 Database Setup

Separate Web/Database Server and Streaming Server


SW 6000 PC
Encoder PC
Firewall
Web & Database Server
End user watching the meeting in a web browser
Streaming Server
Audio/Video
Encoded Audio/Video
JD400 Meeting Encoder
JD450WS
SW 6000 CUI
SW 6086 Web Service Interface
SW 6085 Streaming Appl. Control
JD710 Media Player
JD710WS
JD710 Database Setup
SQL 2005 server
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JD 710 Media Player at the "Web & Database Server" shows archived information and content from the database
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SW 7001 Streaming Package:
- JD400 Meeting Encoder
- JD450 Communication Service (JD450WS)
- JD710 Media Player
- JD710 Communication Service (JD710WS)
- JD710 Database Setup

Why a Streaming Server

A Streaming Server (Windows Media Services) on Win 2003 is to be used for both Direct Broadcast and Archived broadcast for best performance over the internet.

On an intranet a Web Server can be used for showing the archived broadcasts, if the intranet has a high bandwidth. The main difference between a Streaming Server and a Web Server is that the Streaming Server doesn't have to push out the whole video to a user that wants to jump forward in a movie. The Web Server can only push out a movie from its file-start (without knowing its length), so if you want to jump forward it will have to push out the movie so much that it can know where you would want to jump to. The Streaming Server can read how long the movie is, and therefore have logics to jump to a specific part of the movie, and show it from there.

This is the main reason to use a Streaming server, but there are more reasons of course, because the Streaming server only has one purpose, and that is to spread movies (Direct Broadcast and Archived Broadcast) to many viewers as easy as possible.

System designs

The 'Web & Database Server' and the 'Streaming Server' can normally be combined into one server as shown in the first schematic above however for very high performance it is not recommended.

Some requirements specify that the Streaming Server functionality is moved to an external "Service House", which has a high capacity to the web. In this case the "Separate Web & Database Server and Streaming Server" configuration must be used.

SW 6000 Compatibility

The SW 7001 Streaming Software is only compatible with SW 6000 Conference management software version 4.2.20 or higher.

If the SW 6000 Software is an earlier release, an upgrade of the system is needed. Please consult your Distributor for information about updating your system.

JD400 Meeting Encoder

The JD400 Meeting Encoder provides a unique, simple and automated solution for live broadcasting and recording of meetings. The meeting is broadcast via a standard website and you choose to broadcast audio alone or a video signal from one or more cameras. To manage input from multiple video cameras, just plug in a video-mixer between cameras and encoder: simple!

The JD400 is directly connected by the 'SW 6086 Web Service Interface' module to SW 6000 CUI for automatic recording of events and display on the Internet, both live and on demand. The JD400 Meeting Encoder features ongoing notification of the agenda item currently being processed. This allows automatic display, segmentation and classification of the meeting's content, and insertion of waypoints in the media stream to simplify location. These "waypoints" range from general subject level to contributions by individual speakers, while permitting concurrent display of relevant data, such as voting results. Users accessing the website can select from a whole range of search criteria to review the meeting: specific issues/events, name of speaker/speakers, whether they are making or responding to statements and other key data. This ability to index meetings under topics, speakers and a range of other criteria, offering users a detailed search capability, is unique to the JD400 Meeting Encoder. Best of all, once parameters are determined, the whole process is automatic. The time-consuming chore of pre and post-broadcast programming becomes history – just leave it to the JD400.

Other key benefits include the ability to publish the recorded broadcast on demand, with full functionality, as soon as the meeting is over, and a monitoring function that ensures published broadcasts are actually broadcast.

The JD400 Meeting Encoder also features functions to monitor and administrate remote broadcasts via intranet, for example. An administrator can remotely monitor the actual status of a current live broadcast or recording via a website, from which he/she can also control the encoder's activities.

The system comes with a display page that, with a few minor adjustments, can be integrated with your own graphic identity. It also features media player controls to navigate contents and menu. You determine whether the display page is activated in an IFRAME (Inline Floating Frame) on your website, or as a new window.

Multiple benefits of the JD400 Meeting Encoder:

- Automatic installation of the encoder profile and a simple database ensures that you can get your first broadcast up and running quickly and easily.
- Inbuilt function to upload media files and check their distribution.
- Activity alert to warn of processor overload, when there is inadequate storage space or if contact with the media server is unstable.
- Automatic queuing function for the database, to ensure that you "catch up" after temporary loss of contact.

JD710 Media Player

The system comes with JD710 Media Player that, with a few minor adjustments, can be integrated with your own graphic identity. It also features media player controls to navigate contents and menu. You determine whether the display page is activated in an IFRAME (Inline Floating Frame) on your website, or as a new window.

Installation

Encoder PC

Please refer to schematic “Installation design”

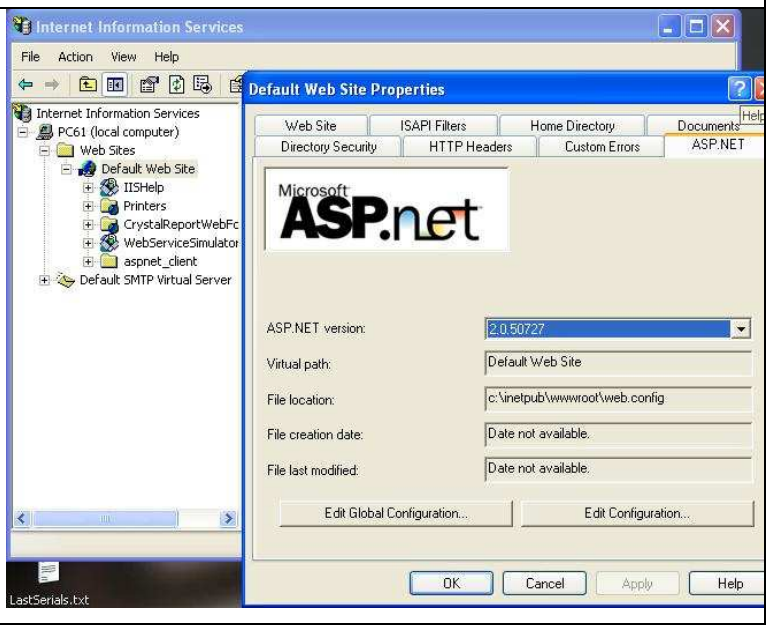
System requirement

The System requirements for a PC running the JD400 Meeting Encoder and the JD450 Communication Service applications are:

Hardware	Software
• Workstation or Server • Min. Pentium 1.5G • Min. 1Gb Ram • 10GB HD • CD-Rom drive • T-base 10 network card • VGA screen, min. resolution 1024x768. • A video capture-card. DIS is recommending Osprey 240, which is a separate capture-card. Other video capture card can be used. Please note, that the card shall run on a MS 2003 Server	• Windows XP • Windows 2003 Server • IIS (Internet Information Services • Dot.Net Framework version 2.0. • Windows Media Encoder 9.0 (downloadable for free from Microsoft)

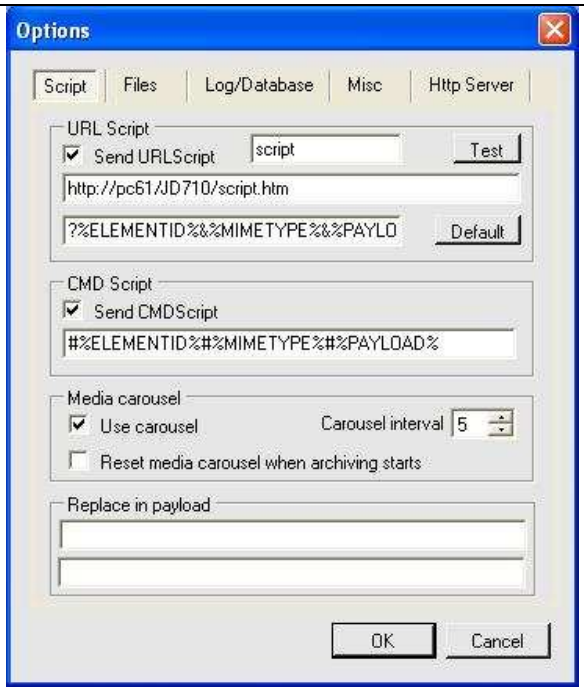
Preparation before installing the applications

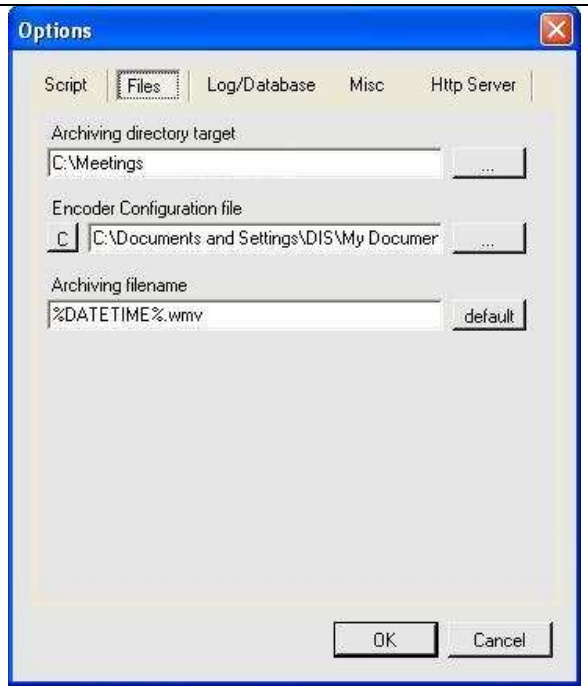
1	Install IIS (Internet Information Services)	
2	Install dot.Net Framework 2.0.	The dot.net framework 2.0 is to be found on the SW 7001 CD or can be downloaded from Microsoft.com
3	Install a video capture-card	Se the Recommendations in the section System Requirements
4	Install Windows Media Encoder 9	The Windows Media Encoder 9 is to be found on the SW 7001 CD or can be downloaded from Microsoft.com

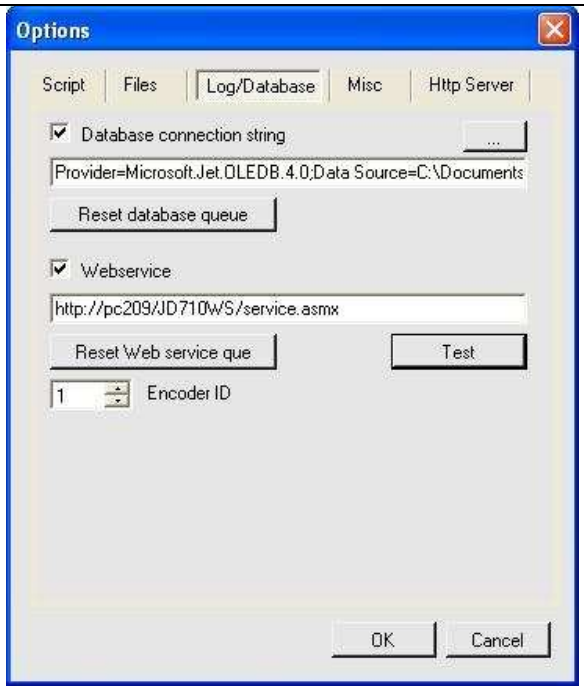
5	The correct network setting has to be applied at the 'Encoder PC'. The Encoder PC must be at the same network as the PC running the SW 6000 CUI Application.	
6	Open Settings->Control Panel-> Administrative Tools->Internet Information Services Select Default Web Site-> Properties->ASP.NET Set ASP.NET version-> 2.0.xxxx	

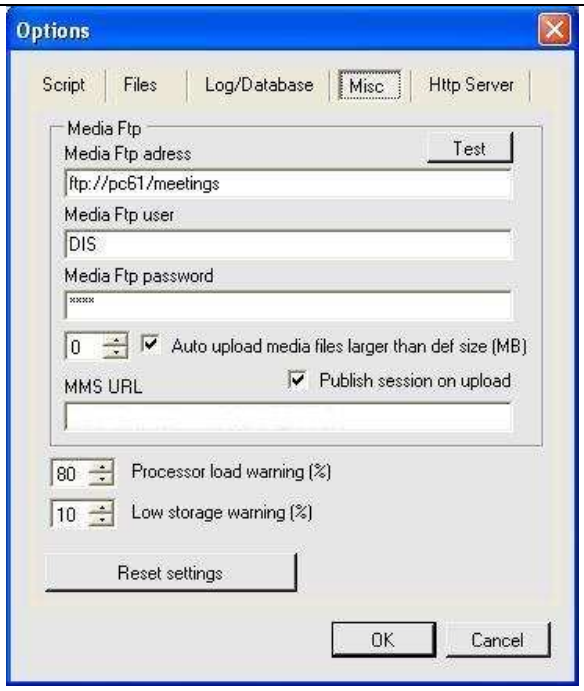
Installation of JD400 Meeting Encoder

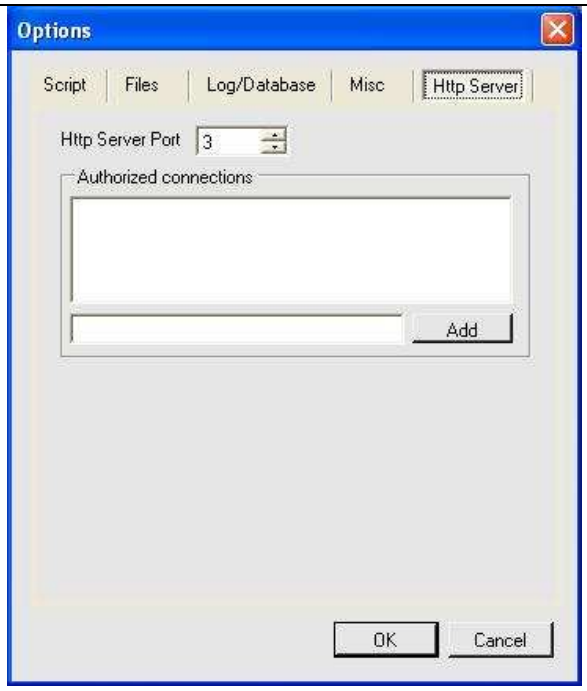
1	Install the JD400 Meeting Encoder by clicking the file 'JD400 MeetingEncoder.msi' in the folder '2. JD400 Meeting Encoder'. The Database from JD400 Settings is as standard to be found at: **My Documents/RecordData.mdb**	The JD400 Meeting Encoder must be installed by an account with administration rights. If you chose 'All Users' you can create more user accounts. **Note.** The user account, where the program is to be started (run) must have administration rights.
2	**Archiving directory** Create an archiving folder on the "Encoder PC" like: **C:\Meetings** This archive is used for temporary archiving the media files before upload to the "Streaming Server"	

3	Start the JD400 Meeting Encoder	
4	Click Settings and then Options	
5	Select the tab Script **URL Script** The complete URL to where the "script.htm" is located is needed to get JD710 Player to work with Firefox. **http://localhost/JD710/script.htm** where localhost shall be replaced with the name of the "Web & Database Server" **CMD Script** Don't change **Media Carousel** Interval for updating the web pages **Replace in payload** Don't use	

6	Select the tab: Files **Archiving directory target** The link to the archive directory created at point 2 above shall be inserted. The archiving directory is where the media files are archived by JD 400 before uploading to the "Streaming Server" **C:\Meetings** **Encoder Configuration File** The path to the Windows Media Encoder configuration file has to be inserted. Default is **C:\Document and Settings\My Documents** Don't change the default Connect the video camera and the sound connection. Check the settings in JD400 Meeting Encoder at: Settings->Options->Files->Encoder configuration file->C Clicking "C" open the configuration page in the Microsoft Media Encoder 9. Changes can be applied there. **Archiving filename** This field is given the format of the archived media file. The variable %DATETIME% is a system variable which is exchanged with an exact "time stamp" accurate down to second level. Don't change the default	

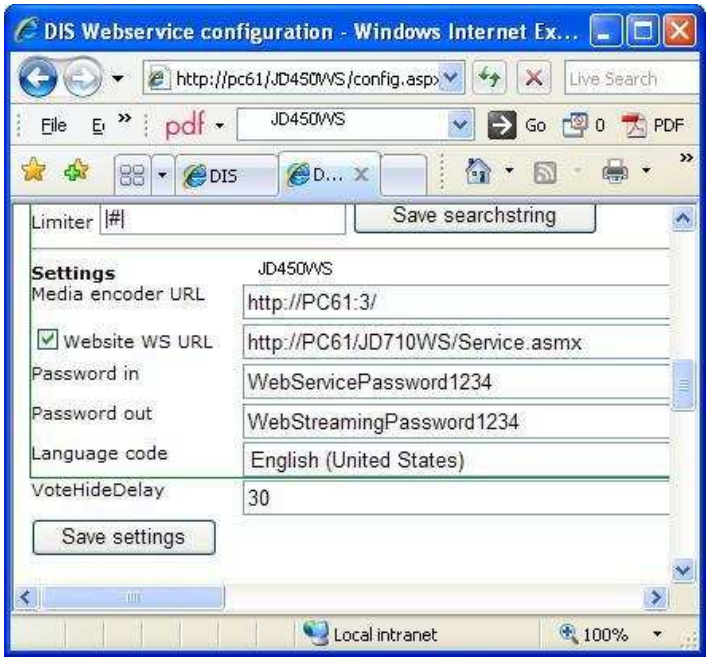
7	Select the tab: Log/Database: **Database connection string** **RecordData.mdb** Don't change the default **Webservice** Insert the correct URL for the JD710 Communication Service (JD710WS) like **http://localhost/ JD710WS/Service.asmx** where localhost shall be replaced with the name of the "Web & Database Server" **Encoder ID** Encoder Id must be 1	

8	Select the tab: Misc **Media Ftp** The media files must be uploaded to a FTP server to a folder accessible for all using JD710 Media Player. The address to the server as well as User and Password has to be filled in. Example of a path is: **ftp://localhost/Meetings** where localhost shall be replaced with the name of the "Streaming Server". Press 'Test' to verify the settings **MMS URL** No entry needed **Auto upload media files larger than def size (MB)** Must be checked for automatic uploading of the media files. Select the minimum size of the file to avoid automatic upload of tests etc. **Publish session on upload** If automatic publishing of the media files to the JD710 Media Player is desired this has to be selected	

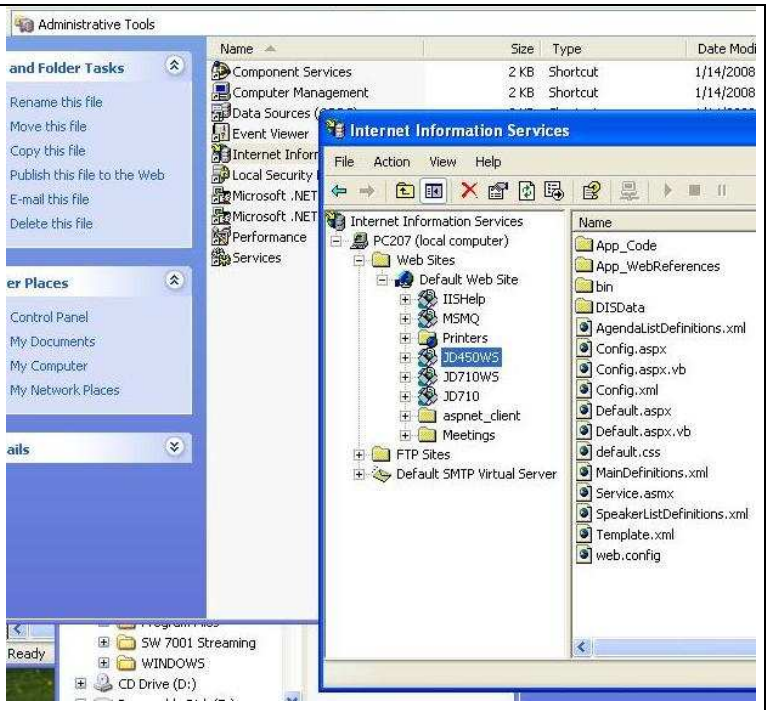
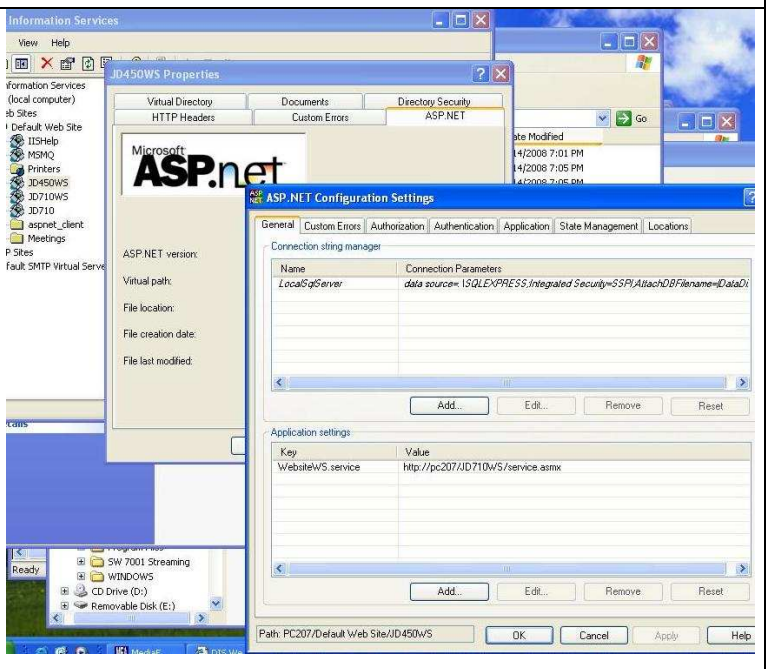
9	Select the tab: Http Server **Http Server Port** Don't change default **Authorized connections** Don't change default	
10	**Firewall** If the Encoder PC has an active Firewall installed the settings might have to be changed. Changes have to be applied making it possible for the server from outside the firewall to reach the JD 400 Media Encoder. It must be possible for the 'Streaming Server' on the internet to request a media stream during direct broadcast. The port 8080 and port 80 must be open in the firewall on the 'Encoder PC'. The port 8080 is used as default but can be changed. If an administrator wants to see the remote control page thought the network port 3 has to be open too.	
11	**IMPORTANT** Please refer to the section **"Getting and inserting the License Key"** in how to insert the License Key	

Installation of JD450 Communication service

1	Install the JD450 Communication Service by clicking 'JD450 Communication service.msi' in the folder' 3. JD450 Communication Service'.	Use default settings
2	Open the folder where JD450WS has been installed. This is as default: C**:/Inetpub/wwwroot/JD450WS** and give the files **Config.xml** **Template.xml** complete rights (Full Control) to "Network Service" (or ASPNET if not running on a Win 2003 Server) This is done by opening the Properties window > Security > Add	
3	Open the folder where JD450WS has been installed. This is as default: C**:/Inetpub/wwwroot/JD450WS** and give the folder **DISData** complete rights (Full Control) to "Network Service" (or ASPNET if not running on a Win 2003 Server) This is done by opening the Properties window > Security > Add	

4	With a web browser open the configuration page **http://localhost /JD450WS/Config.aspx** where localhost shall be replaced with the name of the “Encoder PC” and set ”Media encoder URL” to the correct address for JD400 Meeting Encoder. **http:/PC61:3** where localhost shall be replaced with the name of the “Encoder PC” The address is to be found at ***JD400->Settings->HttpServer URL*** Set “Website WS URL” with the path to the ‘JD710WS URL’: ***http:/ localhost /JD710WS/Service.asmx*** where localhost shall be replaced with the name of the “Web & Database Server” Press ‘Save Settings’	
5	Please refer to the Configuration section for other settings in the **http://localhost /JD450WS/Config.aspx** where localhost shall be replaced with the name of the “Encoder PC”.	
6	It is possible to test, that the web-service is working by opening **http://localhost /JD450WS/service.asmx** in a browser	

Setting of Internet Information Server

1	Open Control Panel > Administrative Tools > Internet Information Services	
2	Open JD450WS Properties > Aspnet > Configuration Settings Change the "Application Settings" to **http://localhost/JD710WS /service.asmx** where localhost is replaced with the name of the "Web & Database Server"	

Web & Database Server

Please refer to schematic "Installation design"

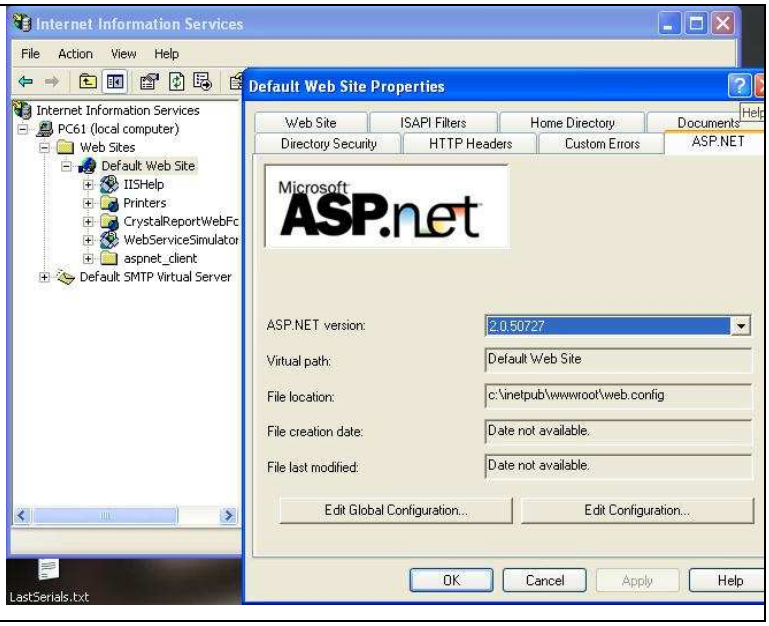
System requirement

The System requirements for 'Web & Database Server" server are:

Hardware	Software
• Min. Pentium 1.8G • Min. 5Gb Ram • 500GB HD (depending on the size of the archived material) • CD-Rom drive • LAN connection	• Windows 2003 Server • IIS 6 (Internet Information Services) • Dot.Net Framework version 2.0. • Microsoft SQL server 2005, Enterprise Edition , Standard Edition or Express Edition (the Express edition is downloadable for free from Microsoft)

Preparation before installing the application

1	Install IIS (Internet Information Services)	
2	Install dot.Net Framework 2.0.	The dot.net framework 2.0 is to be found on the SW 7001 CD or can be downloaded from Microsoft.com
3	Microsoft SQL 2005 Server Install the following applications: Microsoft SQL 2005 Server. For the installation of the Microsoft SQL Server use 'Mixed Authentication'. Use password as "disadm842".	The Microsoft SQL 2005 Server Express is to be found on the SW 7001 CD or can be downloaded from Microsoft.com
4	The correct network setting has to be applied at the 'Web & Database Server': The web server must be reachable from JD450 WS located on the "Encoder PC"	

5	Open Settings->Control Panel-> Administrative Tools->Internet Information Services Select Default Web Site-> Properties->ASP.NET Set ASP.NET version-> 2.0.xxxx	

Installation of JD710 Media Player

1	Install the JD710 Player by clicking the file 'JD710 Player.msi' in the folder '4. JD710 Media Player'.	Use default settings

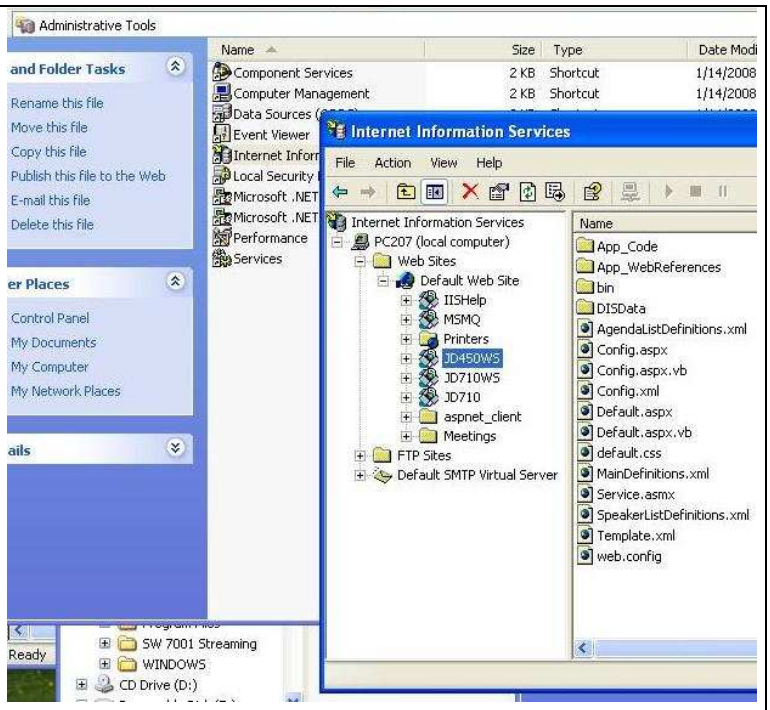
Installation of JD710 Communication Service

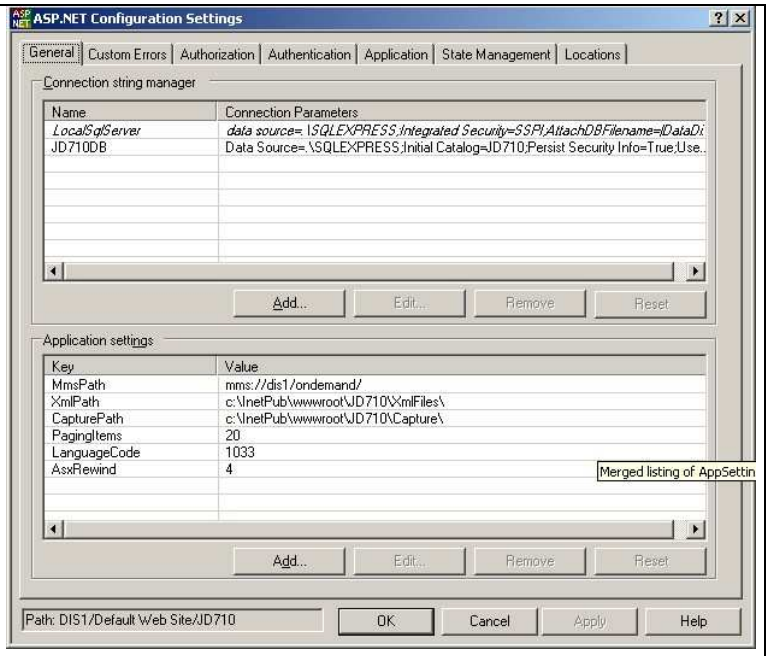
1	Install the JD710 Communication Service by clicking the file 'JD710 Communication service.msi' in the folder '5. JD710 Communication Service'.	Use default settings

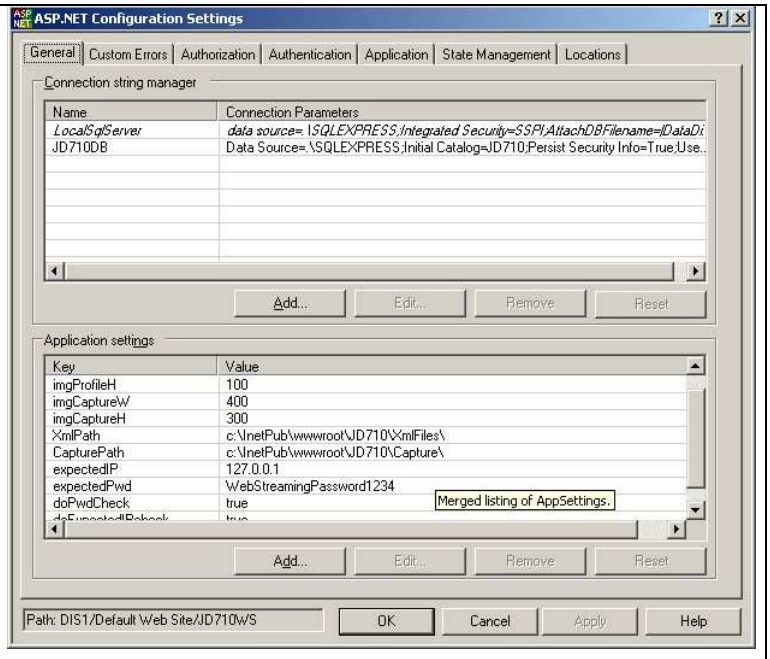
Installation of JD710 Database Setup

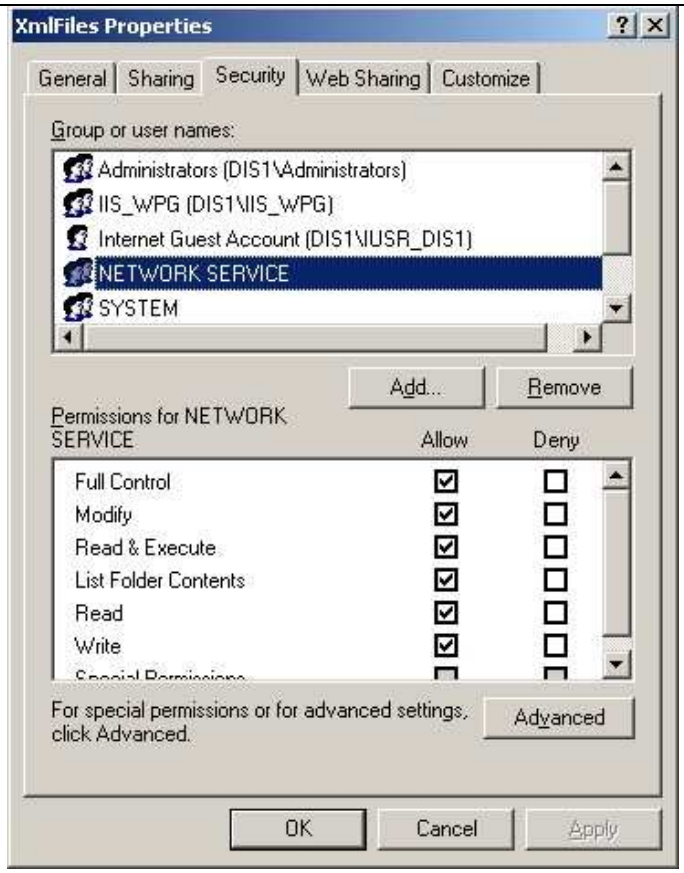
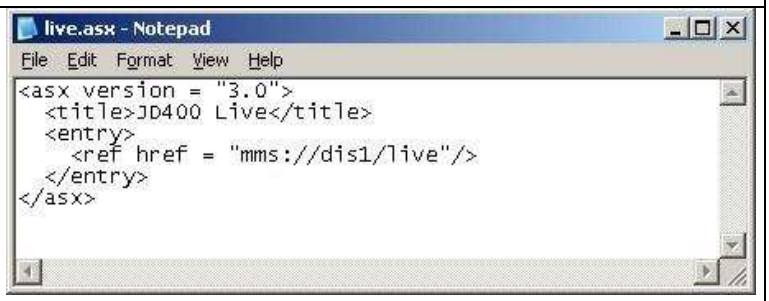
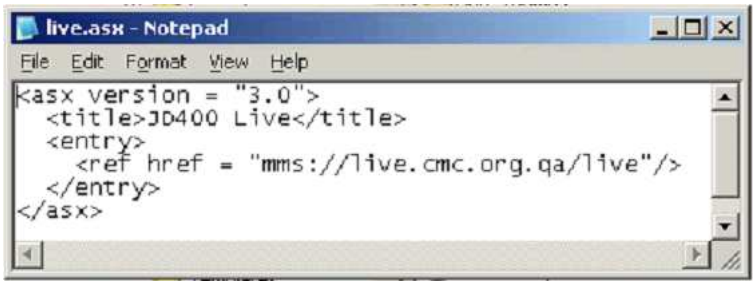
1	Install the JD710 Database by clicking the file 'JD710 Database Setup.msi" in the folder '6. JD710 Database Setup'. The dataset in the database is now created.	If the default is changed remember to make a note of this as the information will be needed during the installation of the JD 710 Media Player and JD 710WS

Setting of Internet Information Server

1	Open Control Panel > Administrative Tools > Internet Information Services	

2	Open JD710 Properties > Aspnet > Configuration Settings Change/check in the “Connection string manager”: **JD710DB = connection string to the database** If the default was used at the installation of JD710DB then no change shall be done to the default Change/check the “Application Settings”: MmsPath = URL to the publishing point for the on-demand files (archived files) at the “Streaming server”. **mms://dis1/ publishingpoint/** An example is **mms://DIS1/Ondemand/** where “DIS1” shall be replaced with the name of the “Streaming server”. If accessing from the Internet, the public name has to be inserted instead of the name of the streaming server like <ref href ="mms://mediaserver.com/live/ "/> XmlPath = path to the XML folder for the JD710 Media Player, which as default is: **C:\\Inetpub\\wwwroot\\JD710\\XmlFiles**”	

3	Open JD710WS Properties > Aspnet > Configuration Settings Change/check in the "Connection string manager" **JD710DB = connection string to the database** If the default was used at the installation of JD710DB then no change shall be done to the default Change/check the "Application Settings": imgProfileW = Delegated picture width imgProfileH = Delegated picture height XmlPath = path to the XML folder for the JD710 Media Player, which as default is: **C:\\Inetpub \\wwwroot\\JD710\\XmlFiles** expectedIP = IP address of the EncoderPC ExpectedPwd = password of the JD450WS doPwdCheck = (true or false) Password will be checked doExpectedIPcheck = (true or false) IP address of the Encoder PC will be checked.	

4	Open the folder where JD710 has been installed. This is as default C:**/Inetpub/wwwroot/JD710** and give the folder **XmlFiles** complete rights (Full Control) to "Network Service" This is done by opening the Properties window > Security > Add	
5	Open the file Live.asx in the JD 710 folder with Notepad. Change the value for href to the publishing point made for live broadcast on the "Streaming Server" like <ref href ="mms://dis1/live/ "/> where 'dis1' is the PC name. If accessing from the Internet, the public name has to be inserted instead of the name of the streaming server like <ref href ="mms://mediaserver.com/live/ "/>	 

Streaming Server

If high streaming performance is needed to the www a streaming server is always needed. This server will normally need a high performance connection to the internet. Regarding the specification for the internet connection please refer to section “Streaming bandwidth and storage”.

Please also refer to schematic “Installation design”

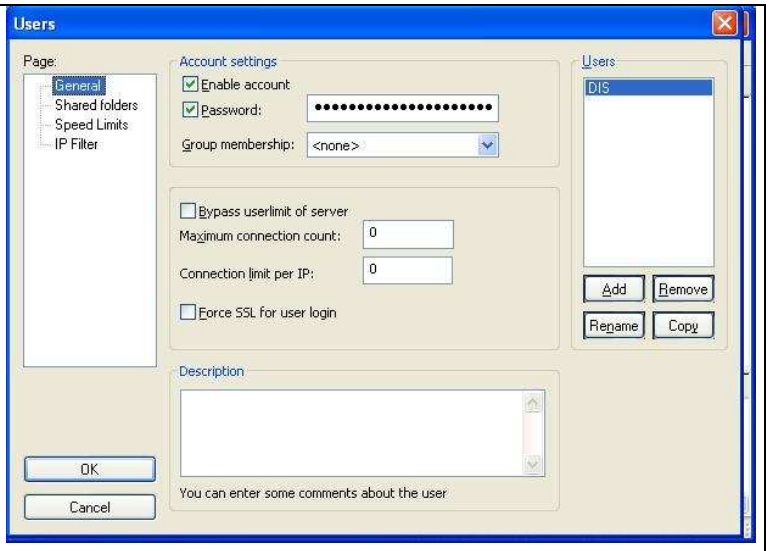
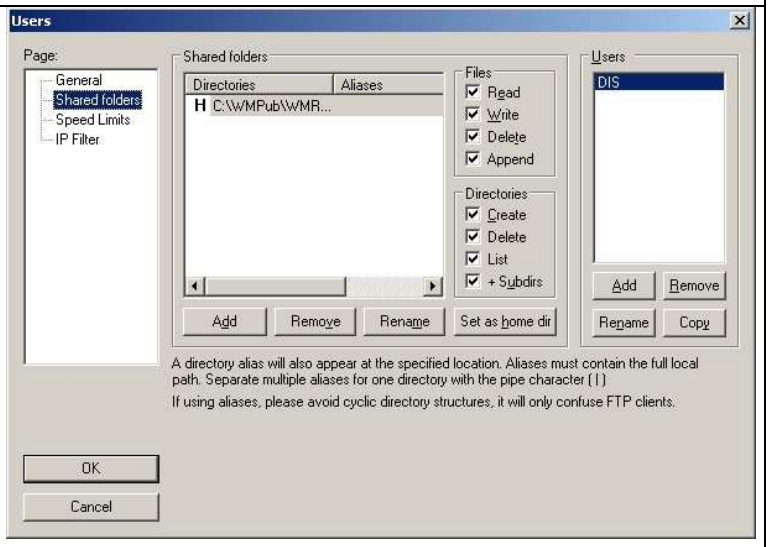
System requirement

The System requirements for ‘Streaming” server is:

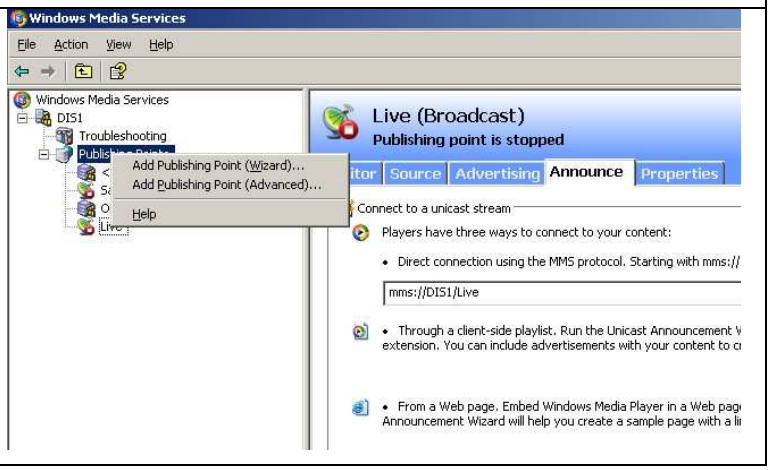
Hardware	Software
• Min. Pentium 1.8G • Min. 1Gb Ram • 10GB HD • CD-Rom drive • LAN connection	• Windows 2003 Server • Microsoft Media Server • FTP Server (like FTP Services in IIS or FileZilla_Server-0_9_23, which is freeware)

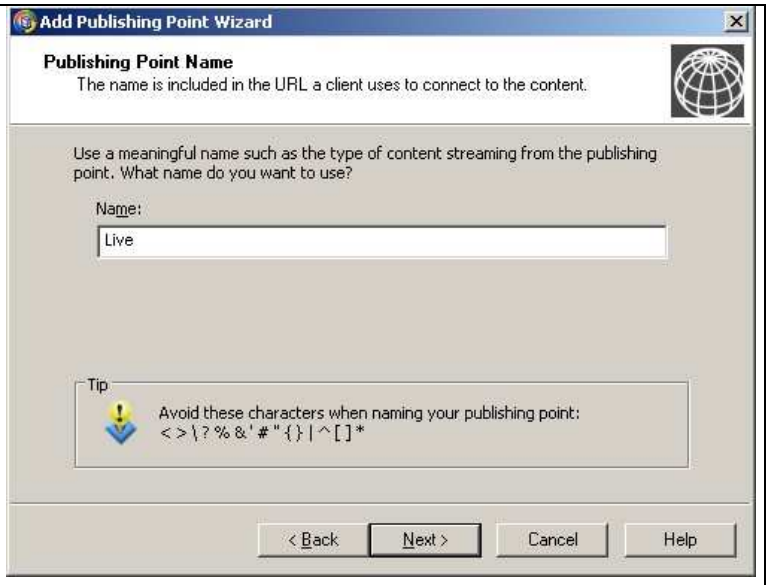
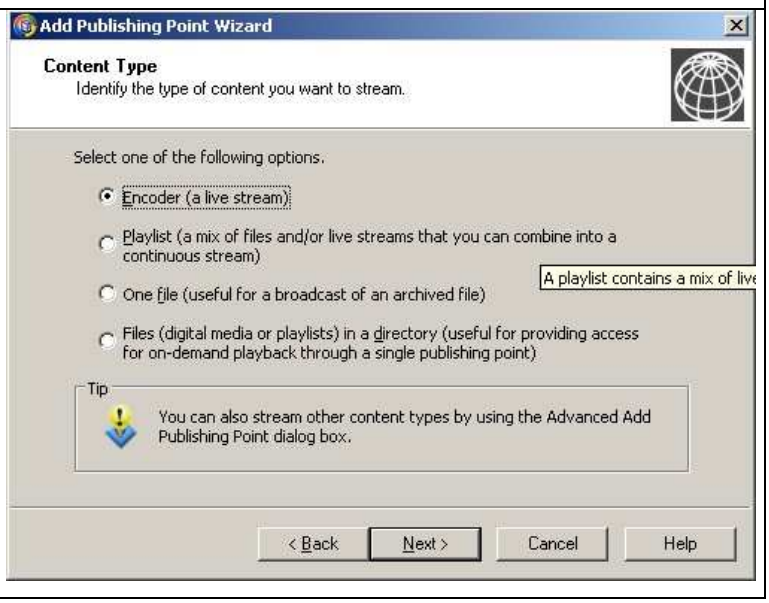
Installation of FTP Server

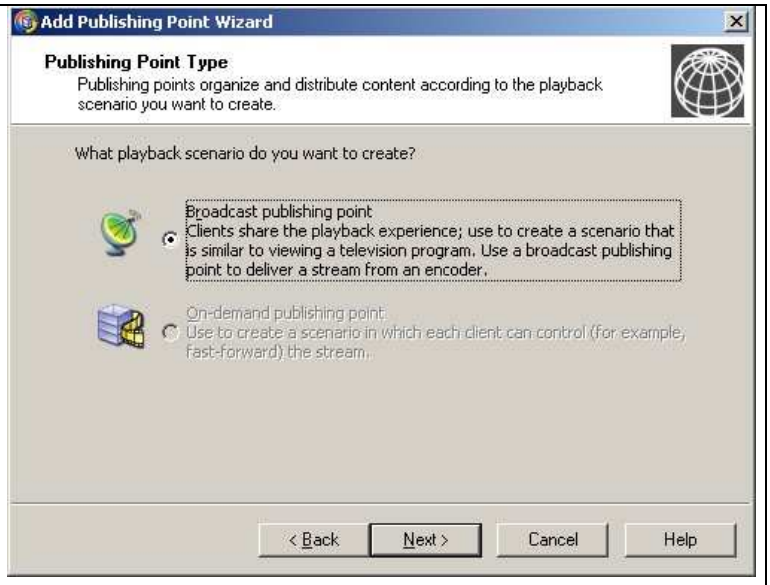
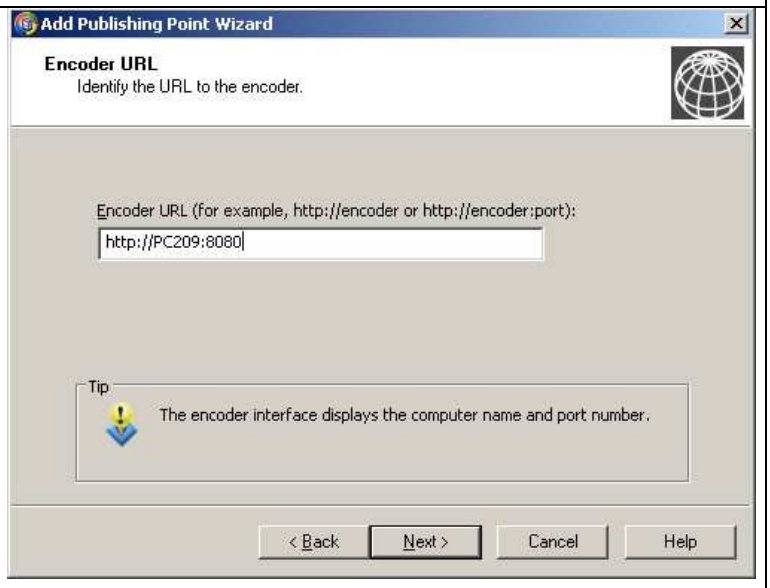
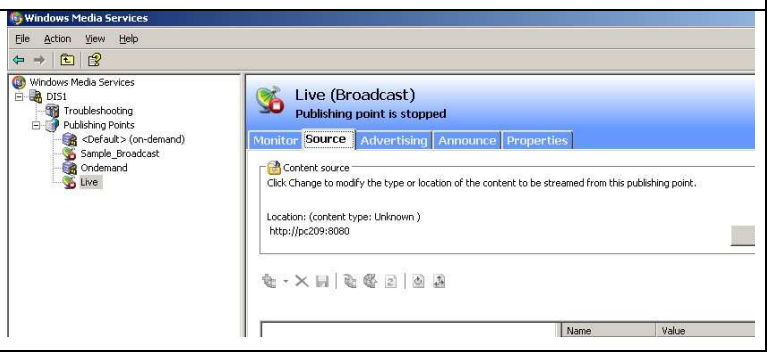
1	Create an archive folder like **C:\WMPub\WMRoot\Meetings**	
2	Install the FTP server The example in the next points is showing how to set up a “Filezilla” FTP server.	

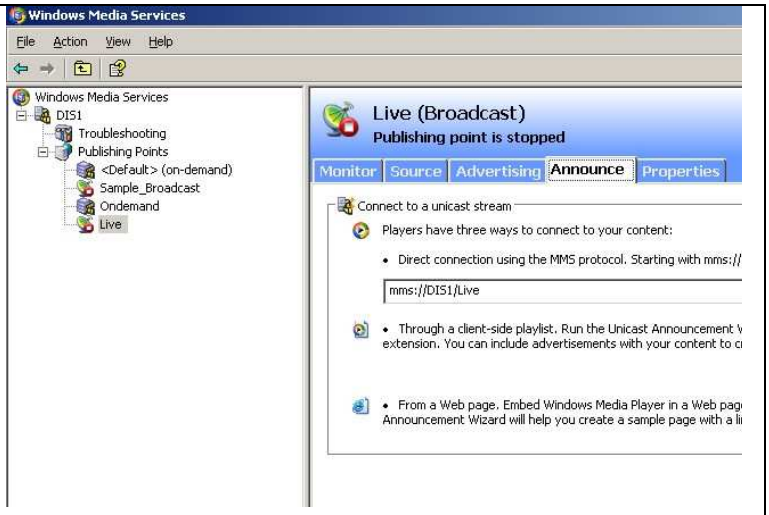
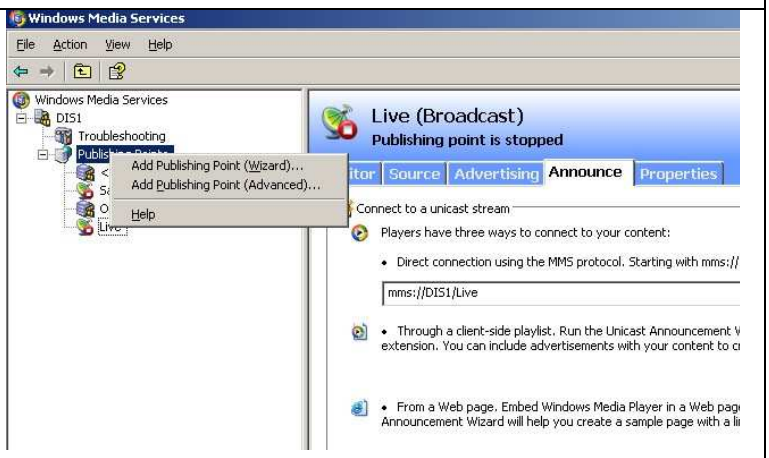
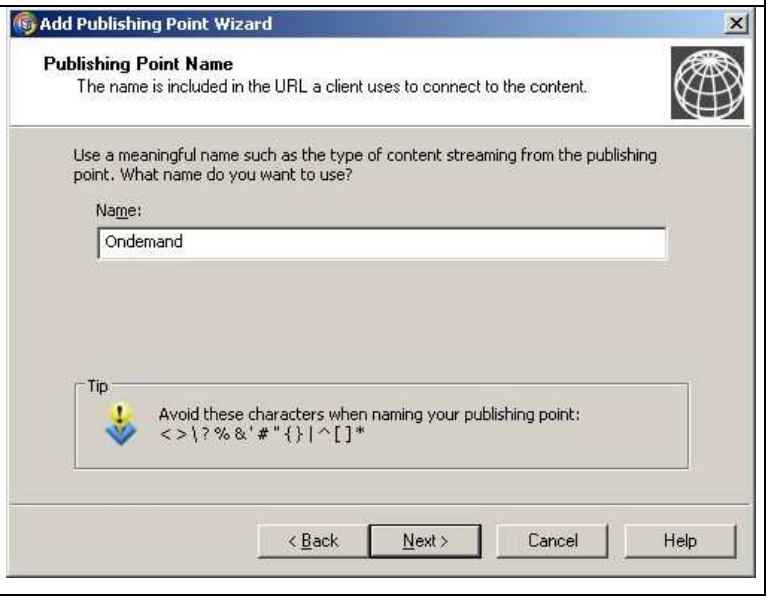
3	Create a user “DIS” Password: 1234	
4	Create a “Shared folder” using the ‘add button’ **C:\WMPub\WMRoot** and give the user “DIS” all rights to this folder	

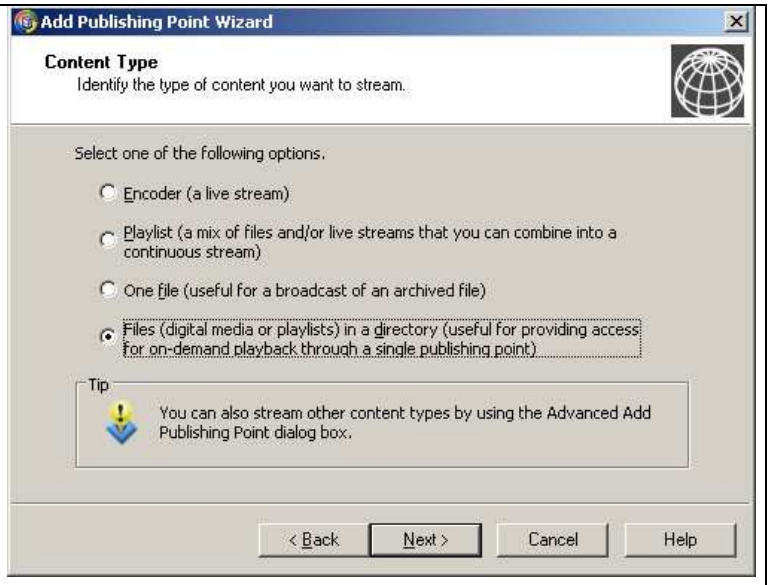
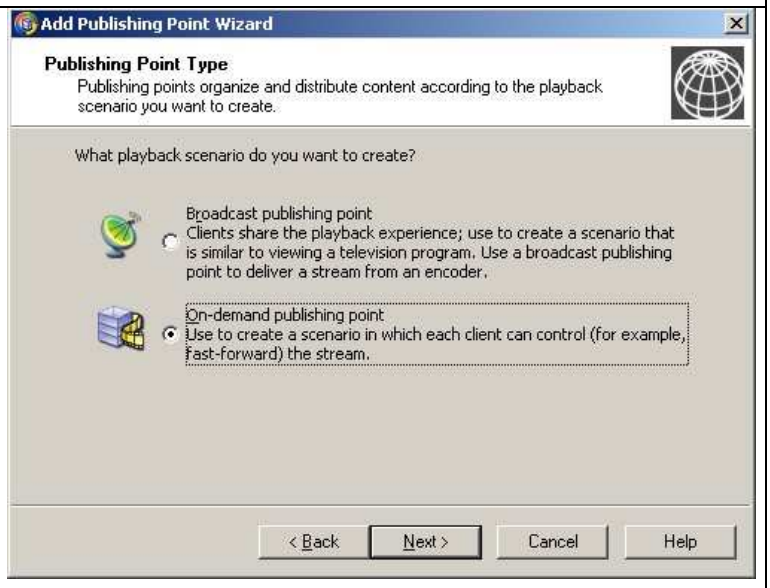
Setting up the Windows Media Services

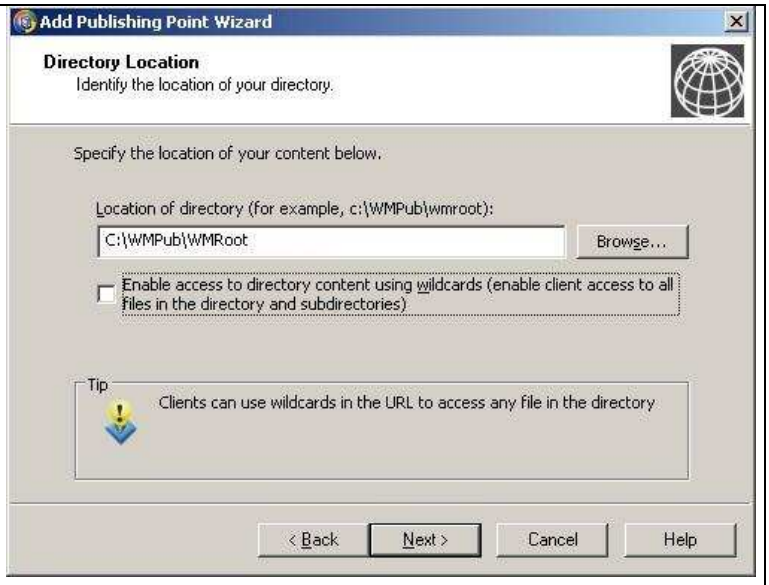
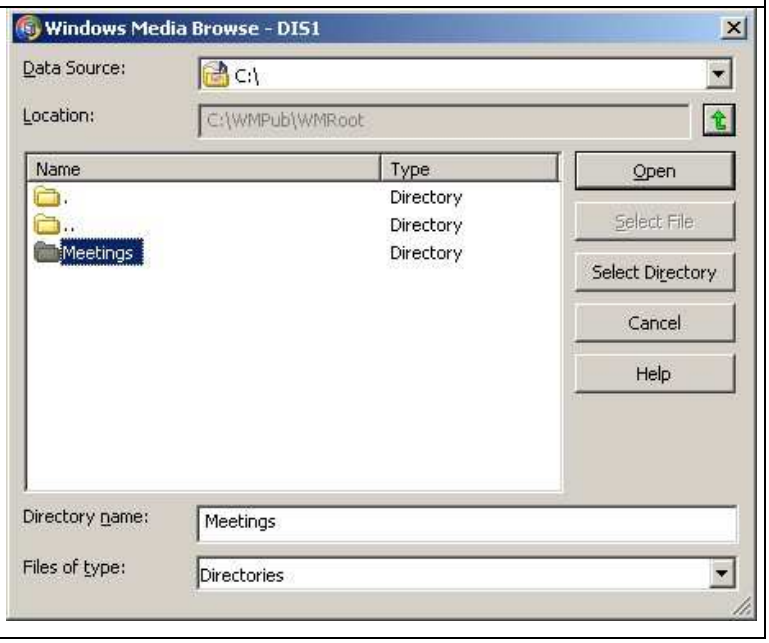
1	Open “Start/Settings/Control Panel/Administrative Tools/Windows Media Services” and expand the folders	
2	Making of the “Live Broadcast” Publishing point. Right Click the folder “Publishing Points” and select “Add Publishing Point…..”	

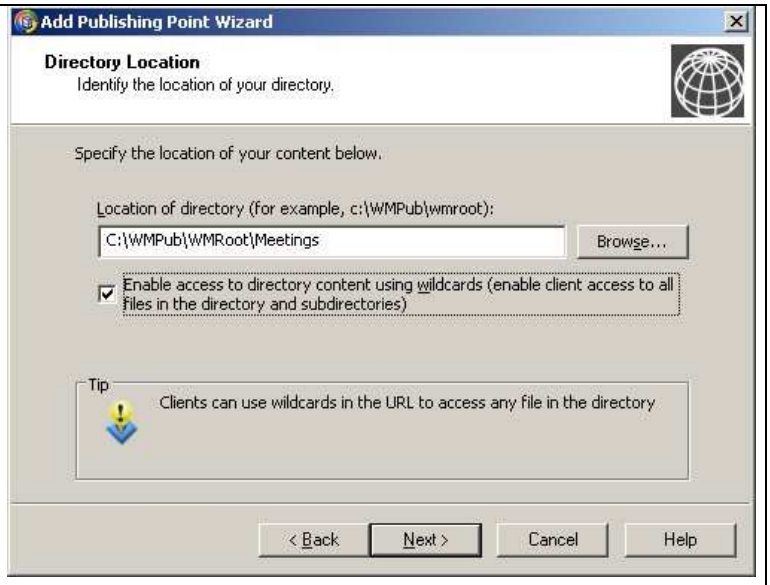
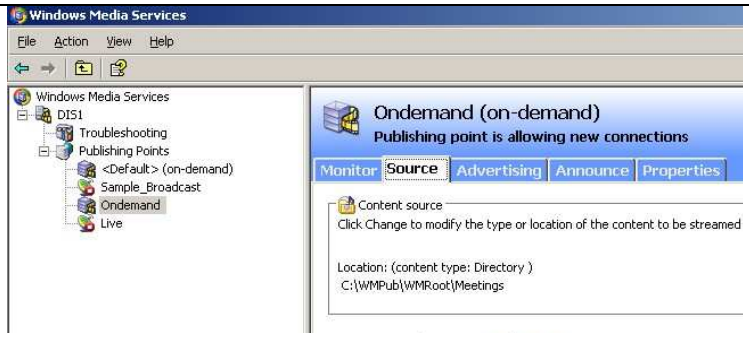
3	Type “Live” (or another meaningful name) Click Next	
4	Select “Encoder (a live stream) Click Next	

5	Select “Broadcast publishing point……” Click Next	
6	Type in the name of the Encoder URL (Encoder PC) like **http:/PC209:8080** where “PC209” must be replaced with the name of the Encoder PC. Click Next Finish the wizard (select no other options)	
7	Click the “Live” publishing point Click “Source” to check the configured location	

8	Click “Announce” This information **mms://DIS1/Live** is used as the “Live Broadcast Connection Point”	
9	Making of the “Archive Broadcast” Publishing point. Right Click the folder Publishing Points and select “Add Publishing Point…..”	
10	Type “Ondemand” (or another meaningful name) Click Next	

11	Select “Files (digital…..” Click Next	
12	Select “On-demand publishing point……” Click Next	

13	Select the location, where the FTP server places the files by clicking the “Browse” button	
14	Click on the “Meeting” directory Click “Select Directory”	

15	Select “Enable access to directory…..” Click Next Finish the wizard (select no other options)	
16	Click the “Ondemand” publishing point Click “Source” to check the configured location	
17	Click “Announce” This information **mms://DIS1/Ondemand** is used as the publishing point for the on-demand files	

CEA Capture Encoder Application

Please refer to the user manual “How to use the CEA Capture Encoder.doc”

User PC

The JD 710 Media Player is optimised to be viewed with a web browser in Windows XP

System requirement

The System requirements for ‘User PC” is:

Hardware	Software
• Min. Pentium 1G • Min. 256 MB Ram • Internet connection, min. 512kb/s • VGA screen, min. resolution 800x600 • Graphic card, which supports Windows media Player • Sound card	• Windows 2000 or XP • Internet Explorer 6 or newer or Firefox 2 or newer • Windows Media Player 9 or later

The DIS Media player can be started by typing **http://localhost/JD710/** in a web browser, where localhost shall be replaced with the PC name of the “Web & Database Server”.

Normally the link to the JD 710 Media Player is placed in the Clients website.

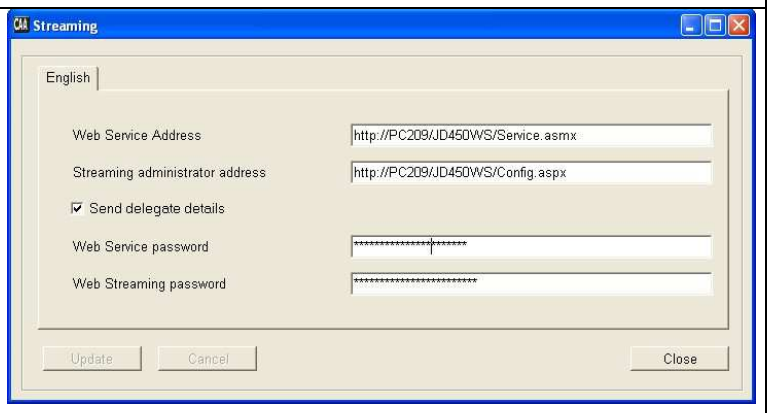
SW 6000 PC

System requirement

The minimum system requirements for a PC running the SW 6000 applications are:

Hardware	Software
• As specified in the SW 6000 Installation Manual	• Windows XP Professional, min. Service Pack 1 • SW 6000 Basic Package • SW 6008 CUA • SW 6085 Streaming Application Control module • SW 6086 Web Service Interface module

Installation and configurations

1	Install the SW 6000 application as specified in the 'SW 6000 Installation Manual' and start the CAA	
2	Click the CAA application ->Setup -> Equipment -> Streaming	
3	Open CAA/Setup/Equipment/Streaming and enter the following: **Web Service Address:** **http://localhost/JD450WS /Service.asmx** **Streaming Administrator Address:** **http://localhost/JD450WS /Config.aspx** where localhost shall be replaced with the Computer name (or IP address) of the "Encoder PC" **Web Service password:** **WebServicePassword1234** **Web Streaming password:** **WebStreamingPassword1234**	
4	Click Update	

5	Open **CAA/Setup/Configuration/ Streaming Configuration** And check that the web service configuration page opens.	

How to get started

Pre-requisite steps before use

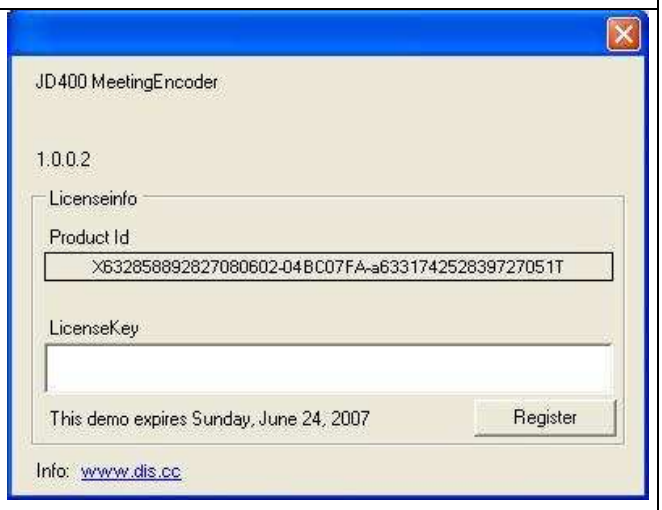
The system should now have been installed successfully.

The JD 710 Media Player might be modified with a customer banner and link to the player should be included in the client web site. App_Themes/JD710 is the path to where graphic and style sheets

Getting and inserting the License Key

The SW 7001 Software needs a license key to operate. **The license key has to be installed not later than 10 days after the JD 400 is started the first time**. Please follow the procedure to get the License Key

After installing the JD 400 it is important, to click “About” and write down the ProductId and send it to DIS

1	After installing JD 400 click “About”	
2	Write down the ProductId	
3	Send the ProductID by e-mail to DIS at the e-mail cph.shipping@dis.cc	
4	After receiving the LicenseKey open About and insert the LicenseKey	
5	Click Register	

Appendices

SW 7001 CD-ROM

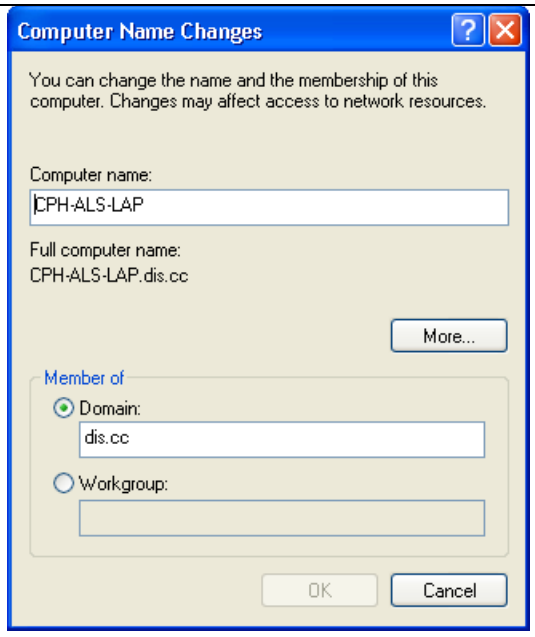
All applications for the SW 7001 Software Applications can be found on the SW 7001 CD-ROM.

All manuals are also on the CD.

Computer Name

Before you start installing the SW 6000 software package you must know the name of the computer on which the database is running. This section of the guide describes how to find the computer name of a computer with Windows XP.

To find the computer name on Windows XP follow these steps

1	Open ‘Control Panel’.	
2	Double click on the ‘System’ icon.	
3	On the ‘System Properties’ window select the ‘Computer Name’ tab.	
4	Click on the ‘Change’ button.	
5	The name of the computer can be found in the textbox labelled ‘Full computer name’. NB You should **not** use the ‘Full computer name’ The computer name must **not** include any spaces, such as ‘MY COMPUTER’	

Automatic startup of JD400

It is normally desirable to have the JD 400 Meeting Encoder automatically start up when the “Encoder PC” is powered on. The procedure is as follows:

Copy the shortcut for the JD 400 Meting Encoder to the ‘Startup’ folder.

After restarting the PC the JD 400 Meting Encoder will start up automatically.

Streaming in general

Streaming media is multimedia hat is continuously received by, and normally displayed to, the end-user while it is being delivered by the provider. The name refers to the delivery method of the medium rather than to the medium itself.

Streaming bandwidth and storage

Streaming media storage size (in the common file system measurements mebibytes, gibibytes, tebibytes, and so on) is calculated from streaming bandwidth and length of the media with the following formula (for a single user and file):

storage size (in megabytes) = length (in seconds) · bit rate (in kbit/s) / 8,388.608

(since 1 megabyte = 8 * 1,048,576 bits = 8,388.608 kilobits)

Real world example:

One hour of video encoded at 300 kbit/s (this is a typical broadband video for 2005 and it's usually encoded in a 320×240 pixels window size) will be:

(3,600 s · 300 kbit/s) / 8,388.608 = 128.7 MiB of storage

if the file is stored on a server for on-demand streaming. If this stream is viewed by 1,000 people using a Unicast protocol, you would need

300 kbit/s · 1,000 = 300,000 kbit/s = 300 Mbit/s of bandwidth

This is equivalent to 125.73 GiB per hour. Of course, using a Multicast protocol the server sends out only a single stream that is common to all users. Hence, such a stream would only use 300 kbit/s of bandwidth.

Unicast protocols send a separate copy of the media stream from the server to each client. This is simple, but can lead to massive duplication of data on the network. Multicast protocols undertake to send only one copy of the media stream over any given network connection, i.e. along the path between any two network routers. This is a more efficient use of network capacity.

Typical System Schematic